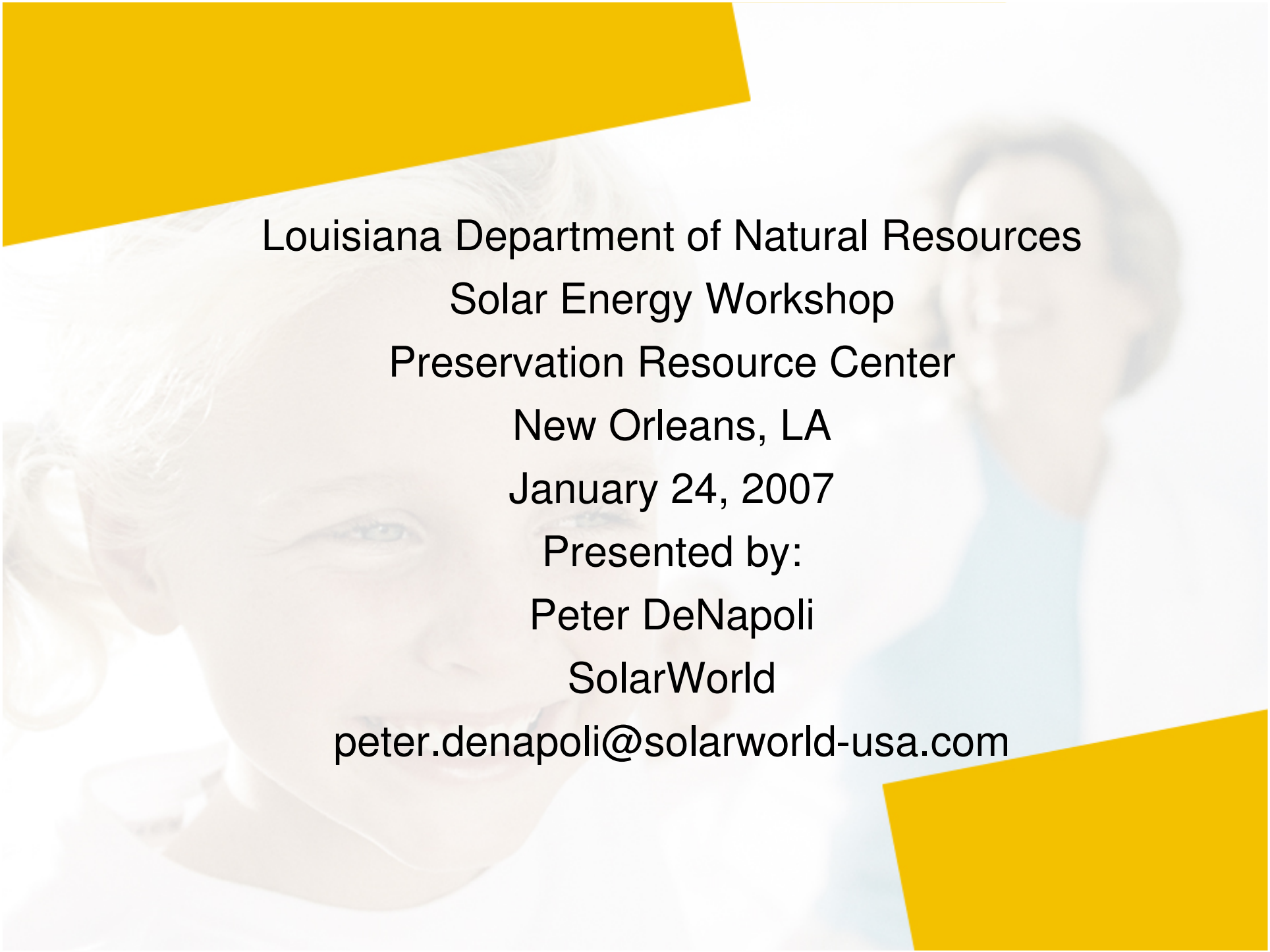


Louisiana Department of Natural Resources

Solar Energy Workshop

Preservation Resource Center

New Orleans, LA

January 24, 2007

Presented by:

Peter DeNapoli

SolarWorld

peter.denapoli@solarworld-usa.com

- *Who We Are?*
- *What Is The Technology?*
- *What Does It Look Like?*
- *What Is the Investment?*

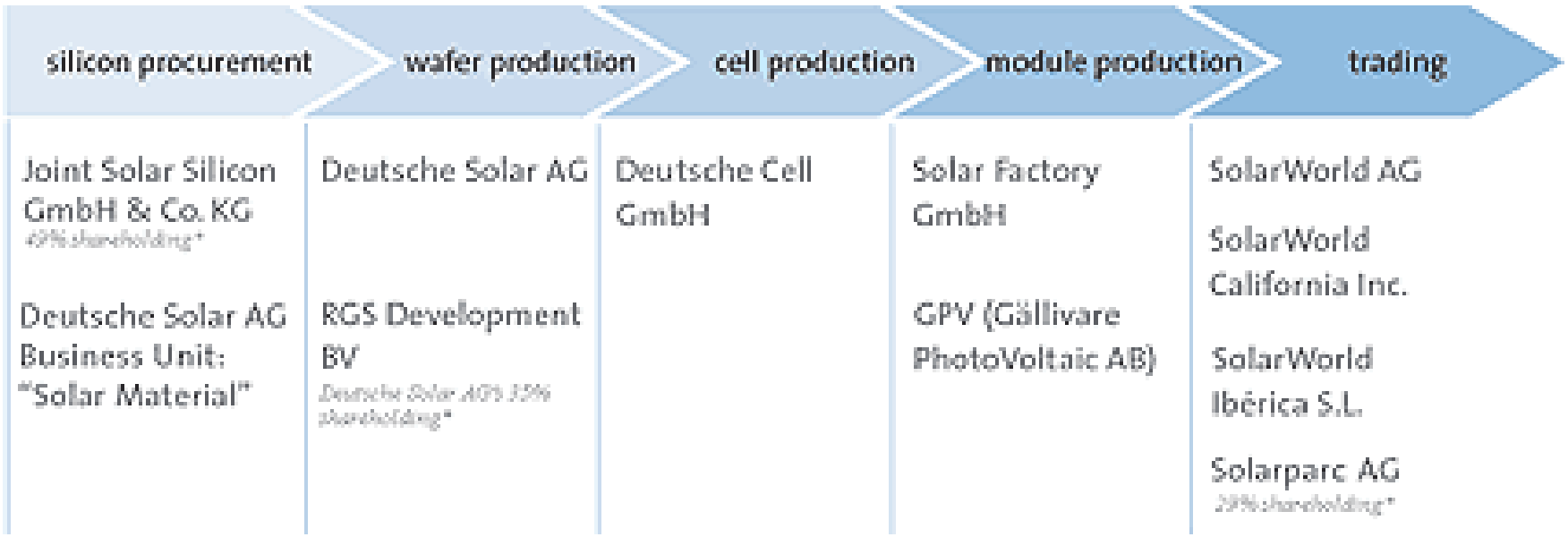
Who We Are

SolarWorld Overview

- Over 29 years experience in PV
- World's 3rd largest PV company, largest US
- Formally: Arco Solar, Siemens Solar, Shell Solar Acquired 100% of Shell Solar (July 2006):
- Only business is PV
- Vertically integrated (cradle to grave)
- Mono, Multi CZ
- 200+ MW production capacity - global
- 80+ MW production capacity - US

Who We Are

Strategy of vertical integration of the solar value chain.



*as at the cutoff date of 31 March 2006
All other companies are wholly-owned subsidiaries of the SolarWorld AG

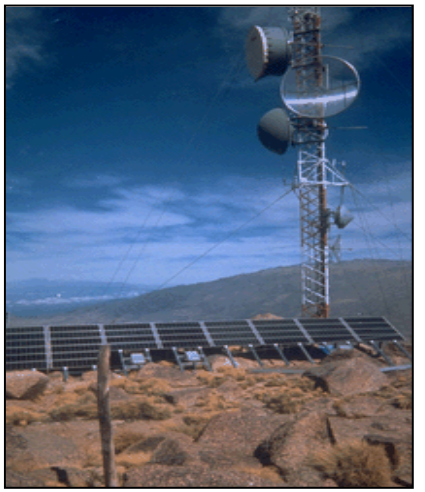
Who We Are

Where we came from. Off-grid remote power.

Wireless Power

for Wireless

Communications

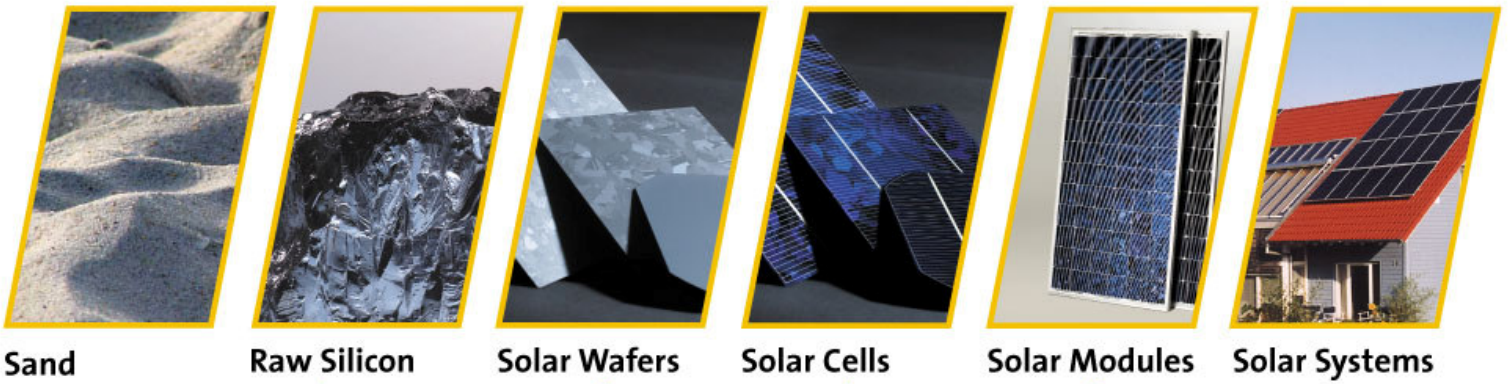


Portable Power

ITS and Traffic

Who We Are

What we do today.



Our Singular Focus!
Solar – Photovoltaics
From Silicon to Systems &
More...

World PV Market

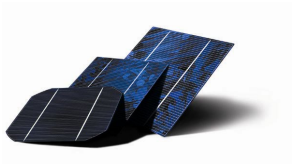
Market By Application MW

Application	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Consumer Products	22	26	30	35	40	45	60	65	70	75
U.S. Off-Grid	8	9	10	13	15	19	20	25	25	35
World Off-Grid Rural	15	19	24	31	38	45	60	75	80	90
Communications and Signal	23	28	31	35	40	46	60	75	80	95
OFF-GRID COMMERCIAL	12	16	20	25	30	36	45	50	60	70
Grid-Connected Res/Commercial	7	27	36	60	120	199	270	360	650	1100
Central >100KW (AC)	2	2	2	2	5	5	5	8	20	60
Total (MW)	89	126	153	201	288	395	520	658	980	1525
CUMULATIVE	289	415	568	769	1057	1452	1972	2530	3610	5135

Source: Paul Maycock

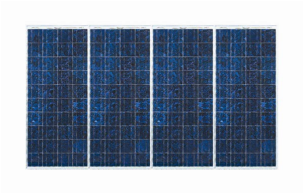
What Is The Technology

Definitions



CELL — Basic building block of a module.

MODULE — Smallest unit that can do real-world work; building block in the field.



PANEL — Modules connected together.

ARRAY — Panels mounted to structure.

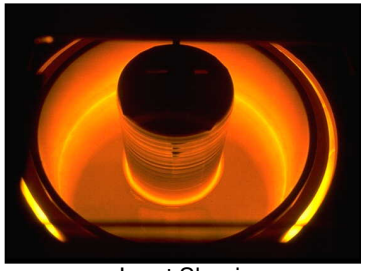
What Is The Technology

Technology Overview

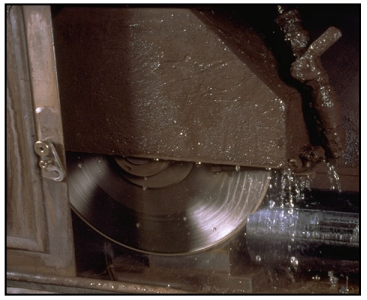
Crystal Growing

Polysilicon Sort , Etch & Pack

Crystal Growing

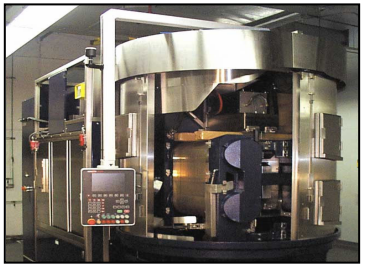


Ingot Shaping



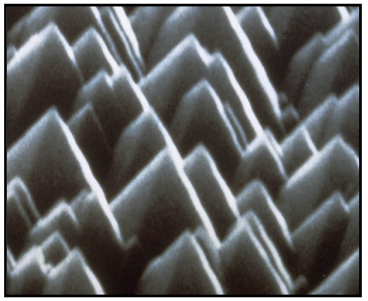
Wafering

Wafer Slicing



Clean & Etch

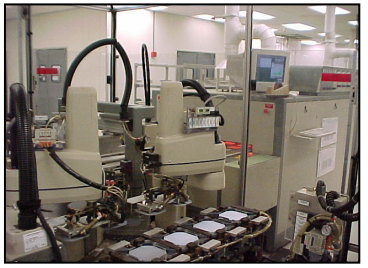
SEM of Wafer Surface



Cell Fabrication

Diffusion & Oxidation

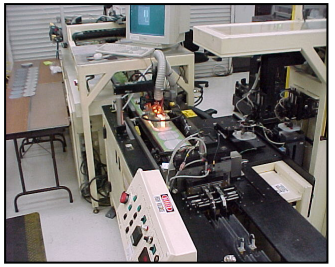
Front & Rear Metalization



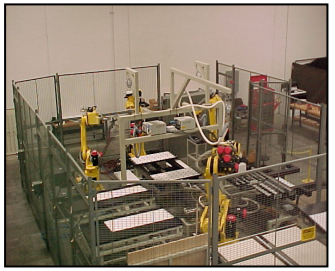
Cell Test

Module Assembly

Cell Stringing



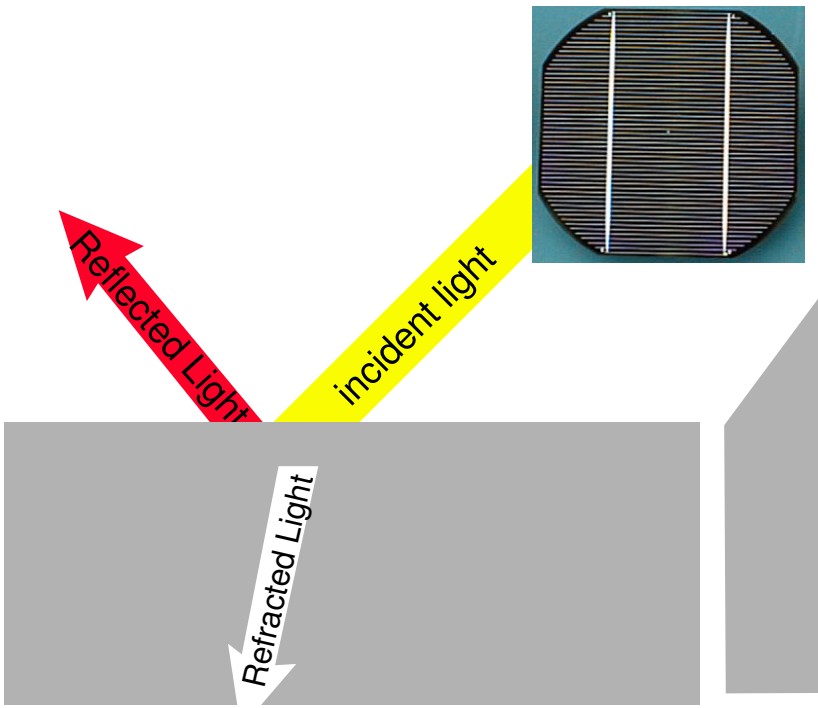
Lay Up & Lamination



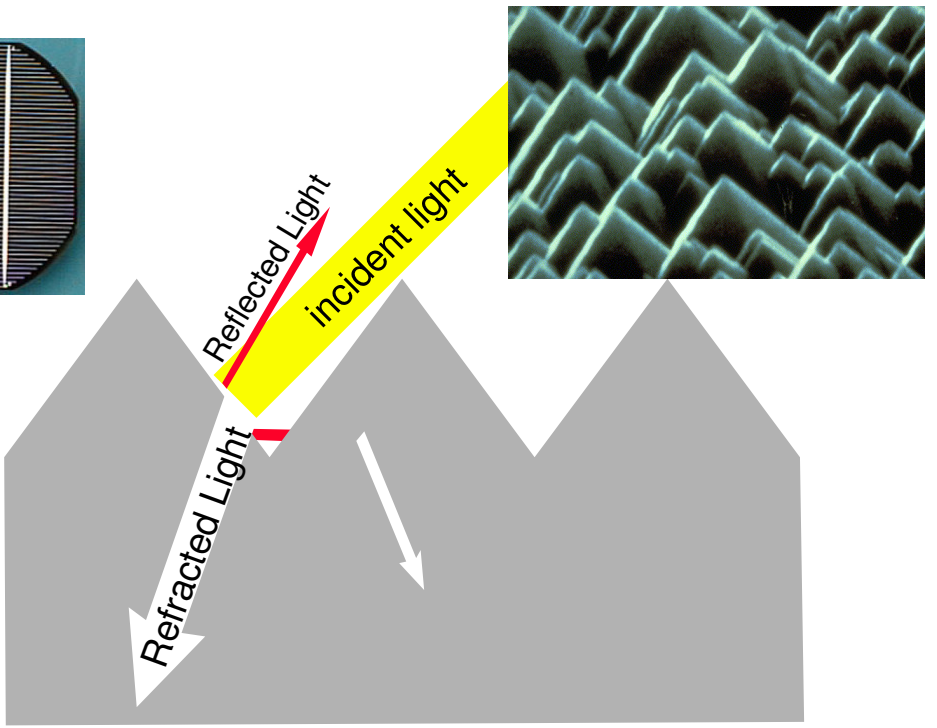
Module Assembly & Test

What Is The Technology

Technology Overview - Cells



Untreated cell

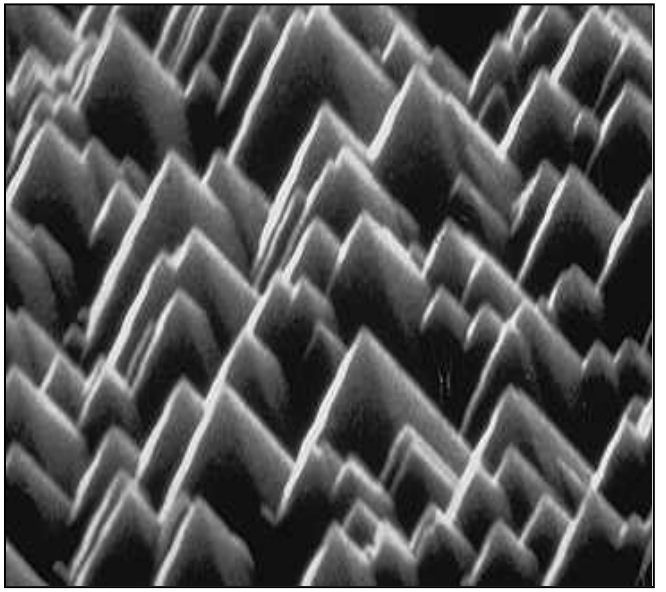


TOPS™ surface treatment improves efficiency by trapping more light and creating a greater active surface area

What Is The Technology

Technology Overview - Cells

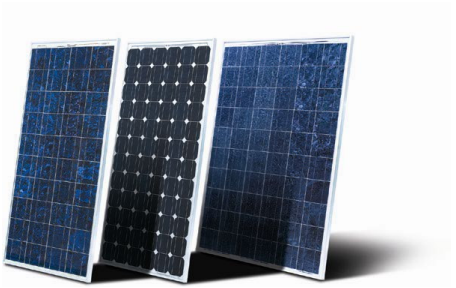
- Crystalline cells 125mm x 125mm (“5 Inch”)
- TOPS™
  Patented micro-texturisation of the cell surface – called TOPS™ (Texture Optimised Pyramidal Surface) to improve light capture & cell efficiency.
- Enhanced “back-surface field” enhances the electricity generating capacity of the cell – delivering more power for the same amount of light trapped in the cell.
- New silicon nitride anti-reflection coating traps more light than coatings previously used resulting in 10% higher cell efficiency.



TOPS™ produces ultra-fine light capturing pyramids.

What Is The Technology

System Overview – Three Main Components



- Modules

- Mounts

- Inverters (Power Controls)

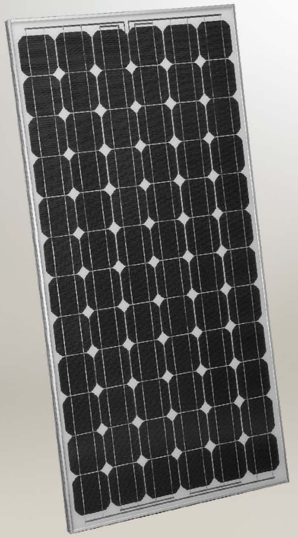
What Is The Technology

SOLARWORLD CALIFORNIA

Technology Overview - Modules

Sunmodule

SolarWorld Module SW 165/175 mono



The Sunmodule SW 165/175 mono by SolarWorld is a superior quality, high performance solar module designed for use in a wide variety of applications.

The preferred module has an industry leading power tolerance of +/-3%, backed by a 25-year power warranty.

The high performance monocrystalline 5-inch cells used in the Sunmodule are sealed in transparent EVA (ethylene-vinyl-acetate) between impact resistant tempered glass and a durable TPT (tedlar-polyester-tedlar) backsheet. The innovative module design incorporates new audible locking, IP65 protection rated, quick connectors for fast, reliable installation wiring. New double-insulated cables approved for use in ungrounded source circuit systems.

The Sunmodule is certified to the stringent safety and design requirements of UL1703 and IEC 61215. All U.S. Sunmodules are produced in the ISO 9001:2000 certified Camarillo, California facility.

SolarWorld offers end of life module recycling for all Sunmodules, further demonstrating our long-term commitment to protecting our environment.

	Module
Length:	63.4 inch
Width:	31.9 inch
Height:	1.3 inch
Frame:	Aluminium
Weight:	33 Lbs.

Edition: January 2007

SOLARWORLD THE SUNPOWERED COMPANY®

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4650 Adohr Lane
Camarillo, CA 93012
800-94-SOLAR
E-Mail: service@solarworld-usa.com
www.solarworld-usa.com

SOLARWORLD THE SUNPOWERED COMPANY®

SolarWorld Module SW 165/175 mono

Performance under standard test conditions (STC)

Peak power (Pmax)	165 Wp	175 Wp
Maximum power point voltage (Vmpp)	34.4 V	35.7 V
Maximum power point current (Impp)	4.8 A	4.9 A
Open circuit voltage (Voc)	43.3 V	44.4 V
Short circuit current (Isc)	5.3 A	5.3 A

Performance at 800 W/m², NOCT, AM 1.5

Peak power (Pmax)	125 Wp	131 Wp
Maximum power point voltage (Vmpp)	31.9 V	33.1 V
Maximum power point current (Impp)	3.9 A	4.0 A
Open circuit voltage (Voc)	40.1 V	41.2 V
Short circuit current (Isc)	4.3 A	4.3 A

Minor reduction in efficiency under partial load conditions at 25°C: at 200 W/m², 92 % (+/- 3 %) of the STC efficiency (1000 W/m²) is achieved.

Component materials

Cells per module	72
Solar cells	monocrystalline silicon
Cell dimensions	125 x 125 mm (5 x 5 in)

Thermal characteristics

NOCT	45.5°C
Pmpp temp coefficient	-0.43 %/ °C
Voc temp coefficient	-145 mA/ °C
Vmp temp coefficient	-127 mV/ °C
Isc temp coefficient	1.4 mA/ °C

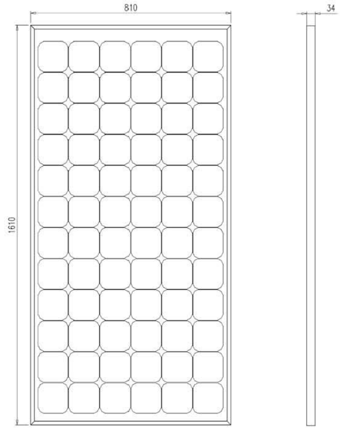
System design characteristics

Maximum system voltage	600V (UL)
Series fuse rating	15 A

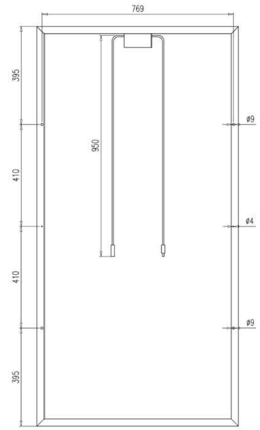
Rated power and maximum tolerance

STC Rated power	165/175 Wp +/- 3 %
PTC Rated power	149.1 W_{PTC} / 158.3 W_{PTC}
Quick Connector protection rating (closed)	IP 65
Connector type	MC Type 4

front view



rear view



Dimensions in mm

Modules certified according to:

IEC 61215
protection class II

c UL US LISTED

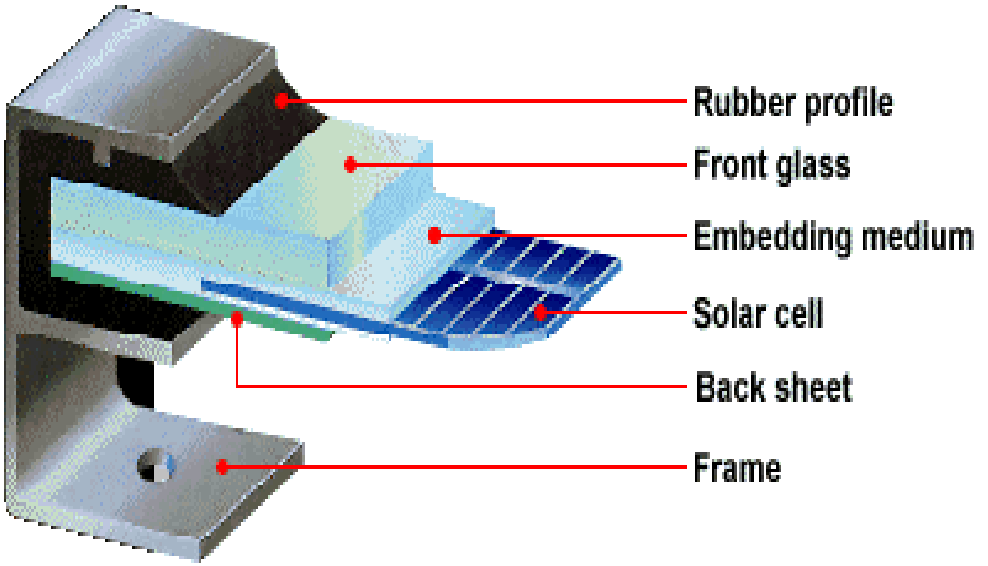
SolarWorld AG reserves the right to make specification changes without prior notice.
For detailed information on this product please consider the installation manual.

U1651751006-2

What Is The Technology

Technology Overview - Modules

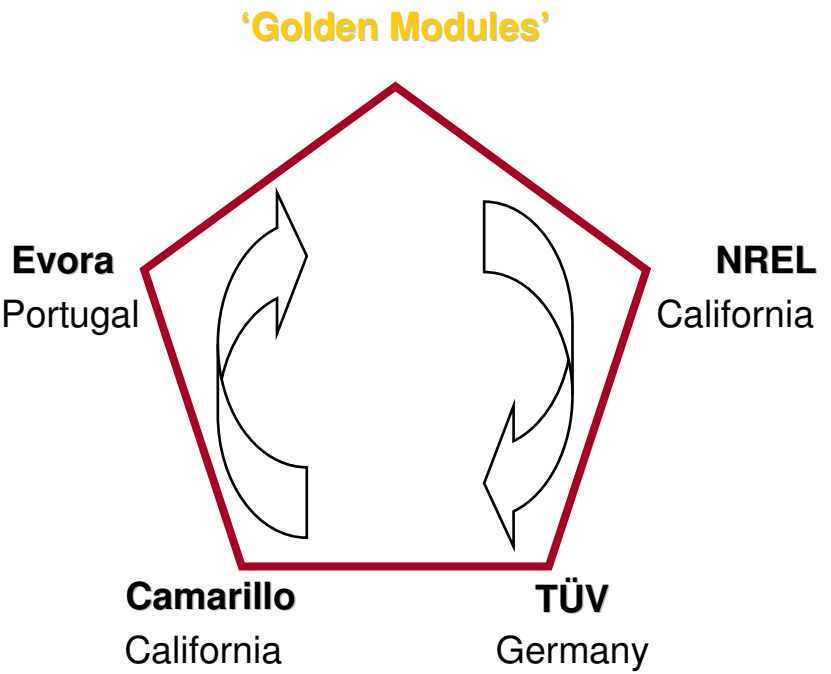
- Low iron, water white tempered glass front
- EVA encapsulant layer
- Solar cell circuit
- Vinyl encapsulant layer
- Tedlar back sheet
- Anodized aluminum frame
- Cable Connectors (Gen3 for ’07 NEC)
- 25 year warranty
- Wind load 120 mph
- UL, CEC, IEC, FSEC certified
- Power tolerance +/- 3%



What Is The Technology

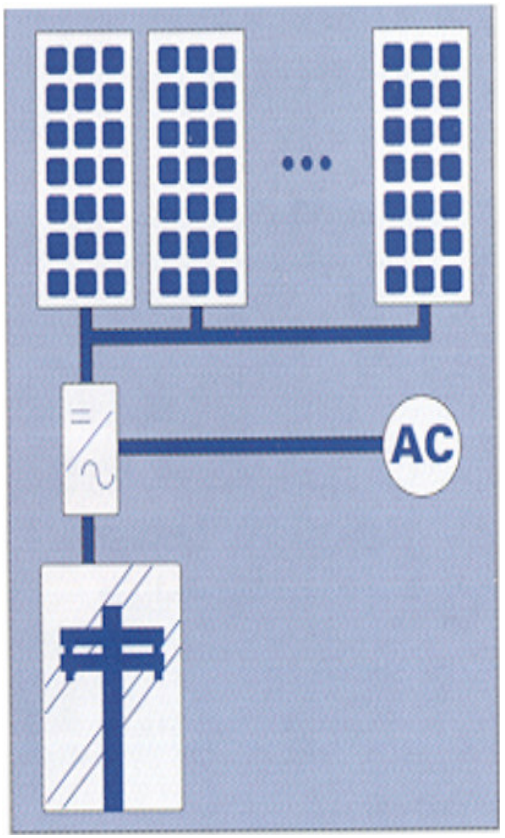
Technology Overview - Modules

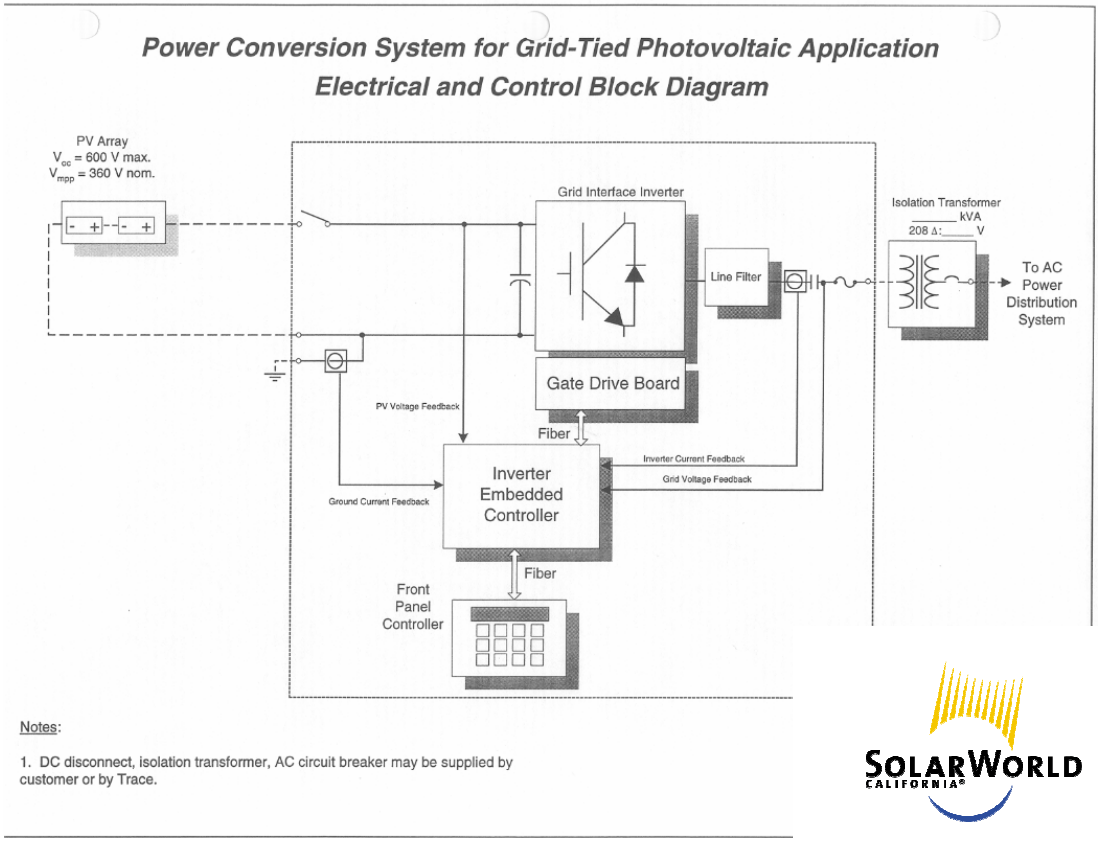
- A sealed box containing ‘Golden Modules’ are shipped in sequence to NREL, TÜV, Camarillo & Evora on an annual basis.
- Each ‘Golden Module’ is tested at each location 5x per day, over 6 different days for a total of 30 measurement.
- During each test the ‘Golden Modules’ have to be stabilised to a temperature of 25 +/-5 degrees centigrade.
- Measurements from each test facility are forwarded to SolarWorld’s Quality Centre in Camarillo to analyse & determine the degree of correlation between SolarWorld’s testing simulators & those of the National Laboratories.
- SolarWorld’s testing simulators are then adjusted, if required, to ensure a high level of correlation with National Laboratories.



What Is The Technology

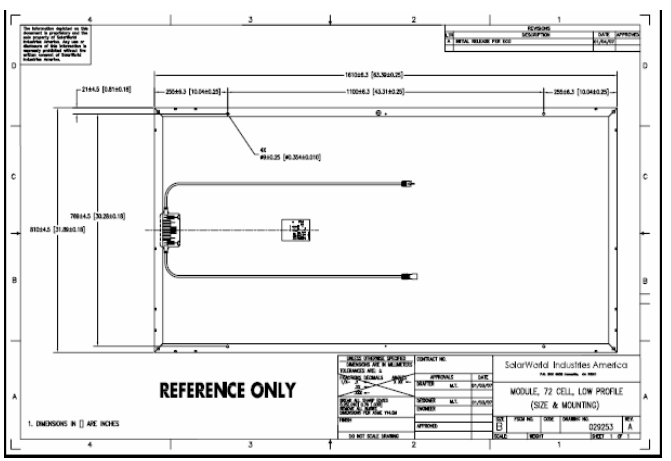
Technology Overview - Arrays

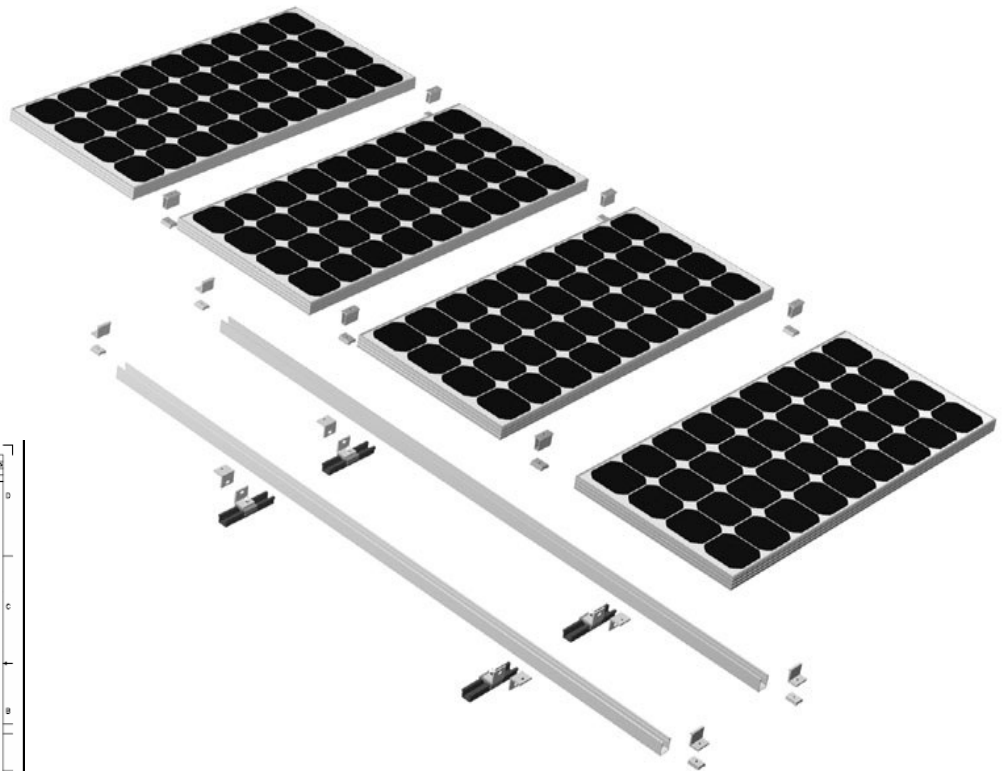




What Is The Technology

Technology Overview – Connectors & Mounts





What Does It Look Like





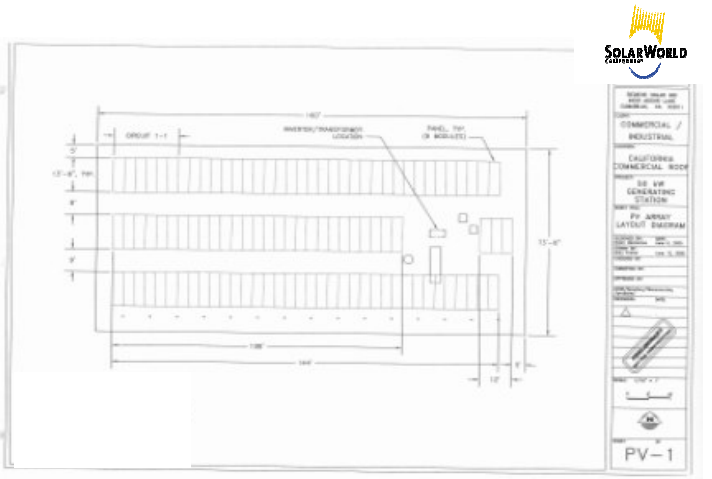

Photos Courtesy of OneWorld Energy

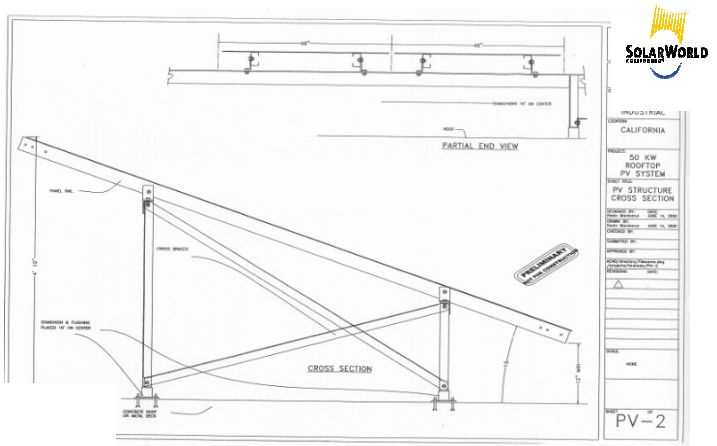
What Does It Look Like

50 kW system

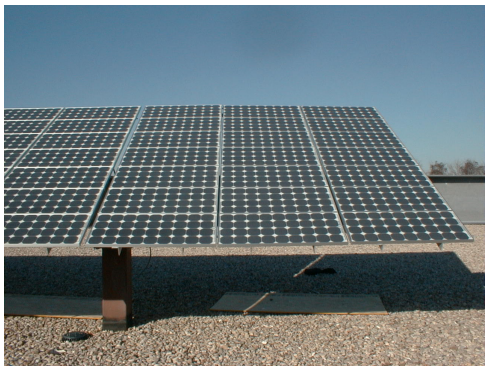
The total PV system has a 50.00 kW rating after accounting for losses and operating conditions</EM

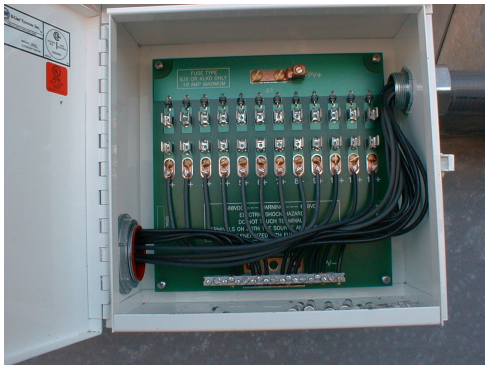
This system has a net savings of $9,735, produces 72,116 kWh of electricity per year, and eliminated 143,367 lbs of CO_2, 571 lbs of SO_2, and 274 lbs of NO_X emissions in the first year.





What Does It Look Like



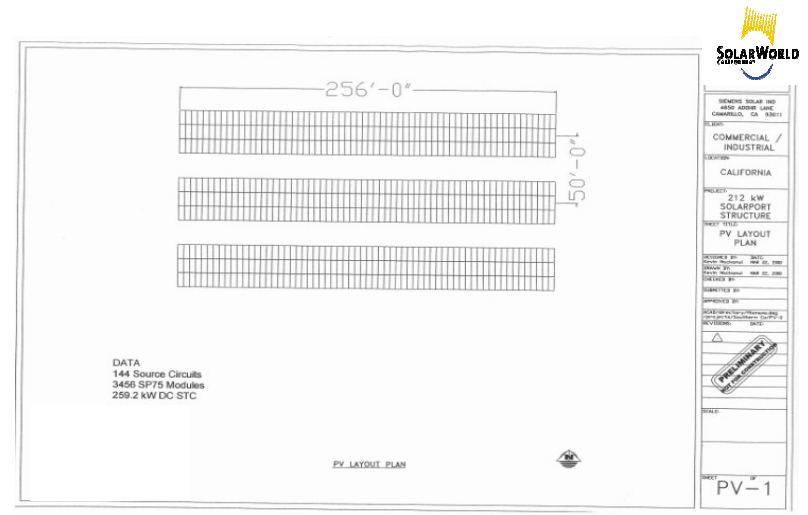


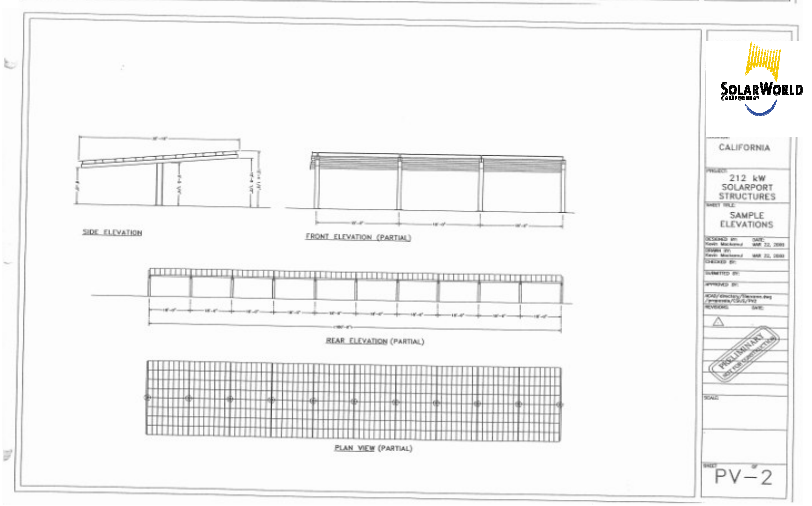
What Does It Look Like

212 kW system

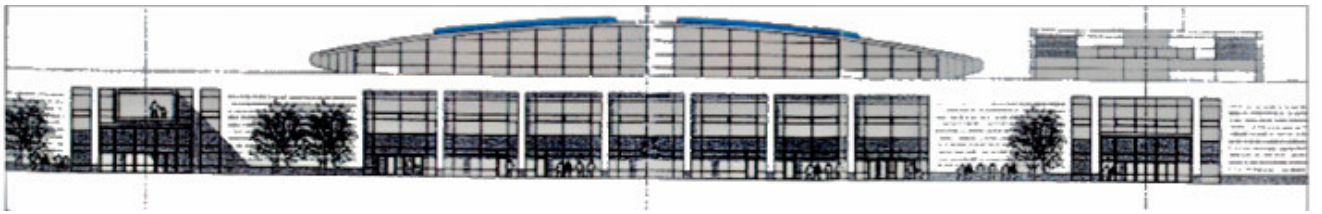
The total PV system has a 212.00 kW rating after accounting for losses and operating conditions</EM

This system has a net savings of $31,354, produces 288,465 kWh of electricity per year, and eliminated 573,468 lbs. of CO_2, 2,285 lbs. of SO_2, and 1,096 lbs. of NO_X emissions in the first year.





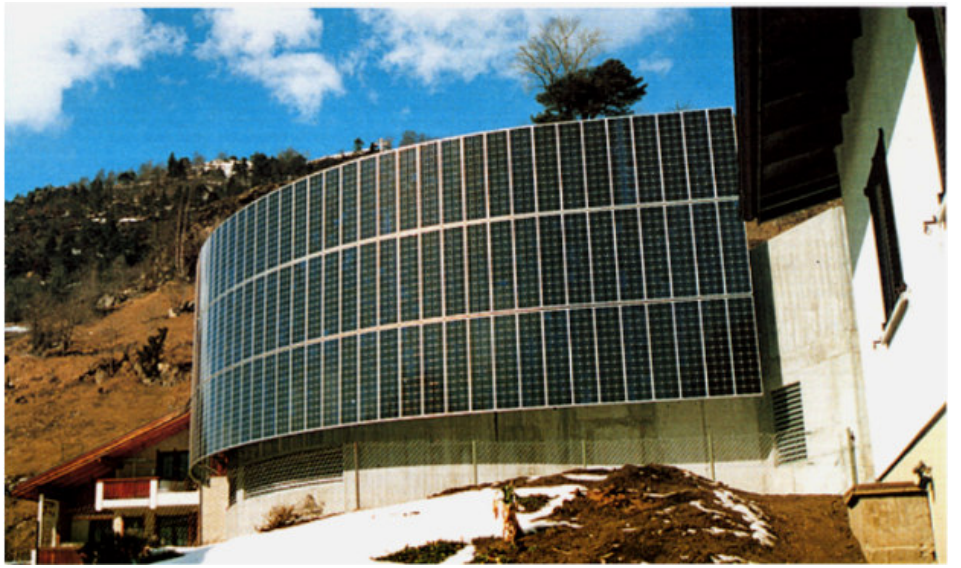
What Does It Look Like



The New Munich Trade Fair Centre

What Does It Look Like

Architectural Beautification Through Solar Integration



What Does It Look Like

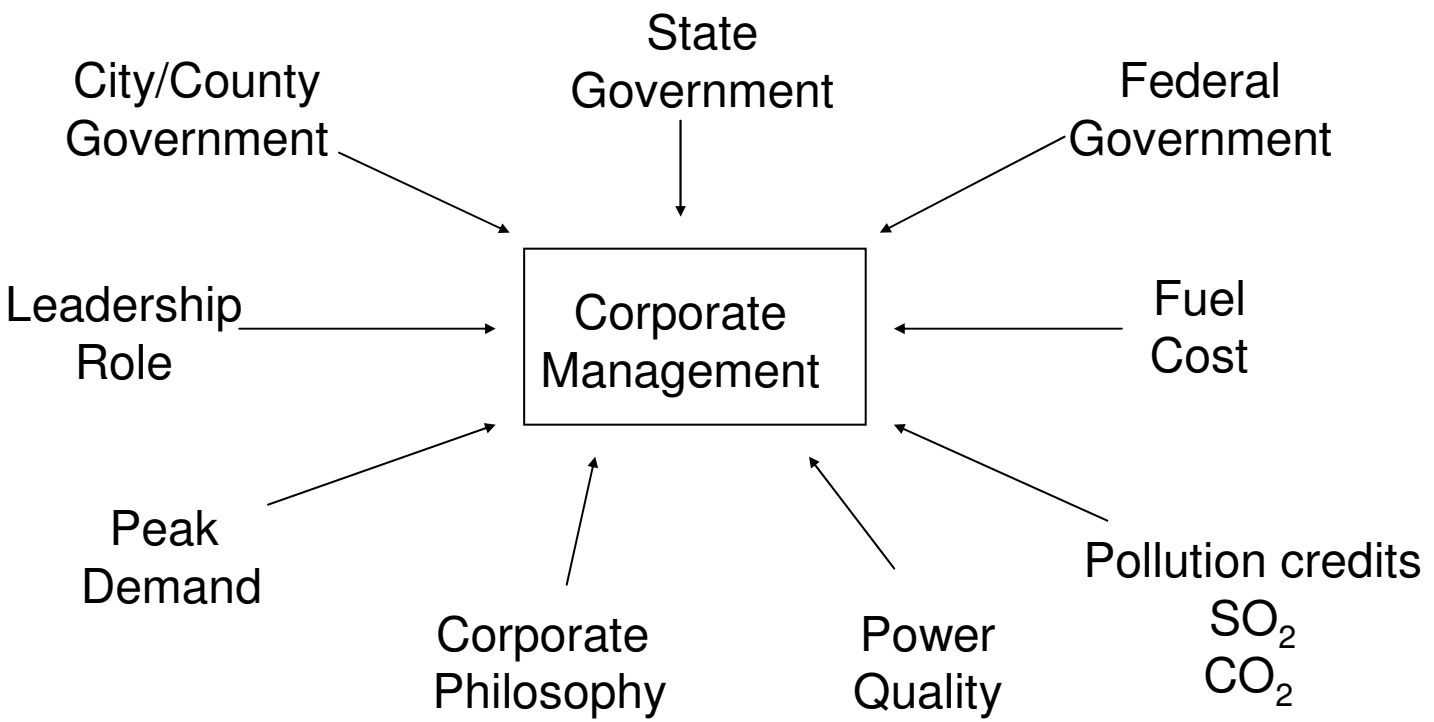
What Does It Look Like

What Does It Look Like

What Does It Look Like

Why Solar Electric

Overview: Reasons for Using Solar



What Is The Investment

Three key elements for good financial investment.

1. Higher Electric Rates
2. Good Incentives
3. Customers, Communities Ready For Solar.

Current Incentives Available in Louisiana:

Federal tax credit: 30%

State of Louisiana: $0.00

City of New Orleans: $0.00

What Is The Investment

Solar Electricity by SolarWorld - 100 kW Example (Florida)

• Installed Price	$800,000
• Less Federal Tax Credit (30%)	($240,000)
• Less State Rebate ($4.00/Watt Peak)	($400,000)
• ***Net System Cost***	***$160,000***
• ***Energy Savings (Accumulated Revenue 25 Years)***	***$543,773***
• ***IRR (After Tax)***	***32%***
• ***Payback period (Accounts for Depreciation)***	***2 years***
Net System Cost if in LA	$560,000

What Is The Investment

A sound financial investment:

- 3-4 year payback (with incentives)
- Internal rates of return (IRR) over 20% are common
- 25+ years of free energy
- A 100 kW system can save you over $500K in energy
- Hedge against rising and unpredictable energy costs

What Is The Investment

If you have been buying electricity for the past 10 years..

* You already made the investment ($159,685.00)

- Federal tax credit 30%
- State incentive at $4.00/watt,
- Electric rate of $.10/kWh,
- Utility escalation of 3%/year,
- Inflation 1%

Thank you.

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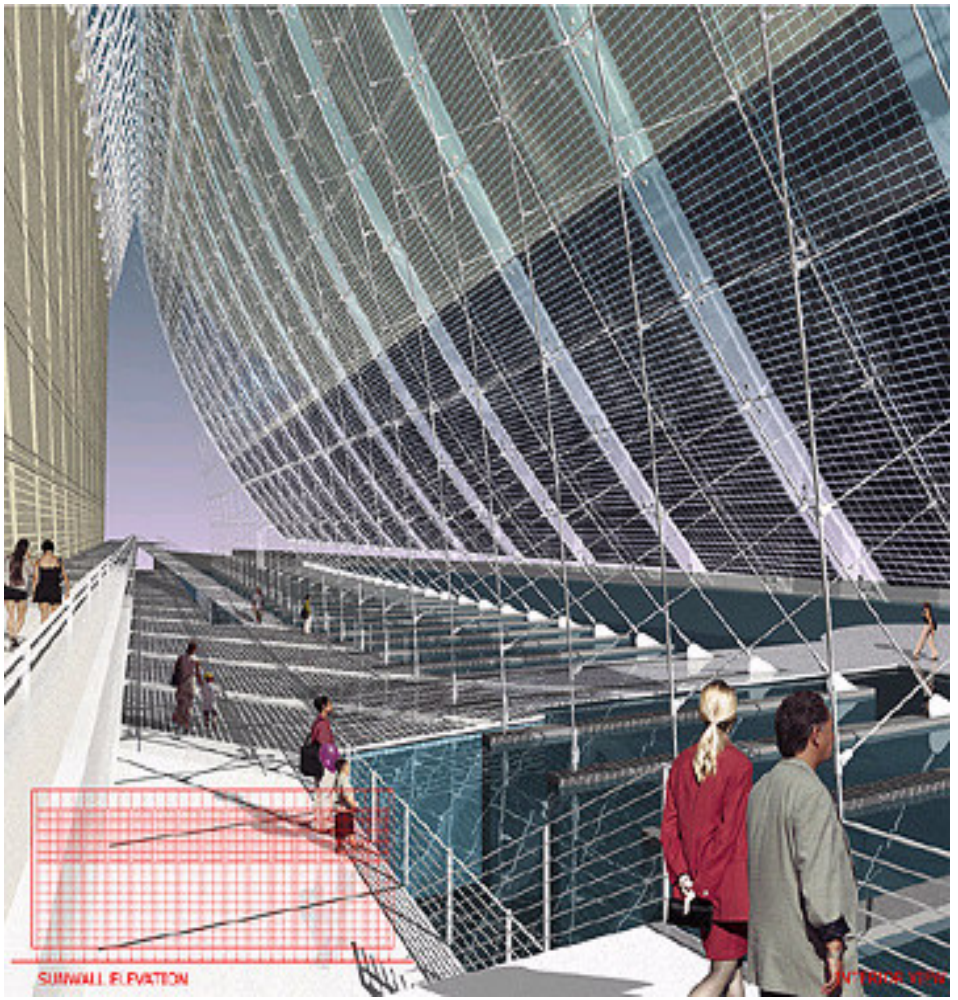
SOLARWORLD
CALIFORNIA®

What It Looks Like…



Tomorrow!

SolarWorld…

The right company.

The right technology!